

## SHORT COMMUNICATION

### FOSSIL PHOCID SEALS FROM THE LATE TERTIARY OF VICTORIA

The living seals of the Southern Hemisphere are diverse, abundant, and widespread. In contrast, there are few published records of Southern Hemisphere fossil seals, and the most significant of these are recent finds from South America and South Africa. Accordingly, until very recently, discussion of the early history of seals has been based primarily on Northern Hemisphere fossils and discussion of paleozoogeography has been biased because of a lack of southern records. The only fossil seal reported previously from Australia is a skull of the sea-lion *Neophoca cinerea* (Otarioidea—fur seals and sea lions) from the Upper Pleistocene, Queenscliff, Victoria (Gill 1968), which was described originally by McCoy (1877) as a new species, *Arctocephalus williamsi*. Here we present a preliminary report of the discovery of fossil phocid seals (Phocidae—true seals) from Victoria.

#### THE VICTORIAN SPECIMENS

The recently-discovered Victorian fossils encompass a few diagnostic bones that are held by the National Museum of Victoria (NMV), Melbourne. These include P41759, two fused eroded sacral vertebrae (from Beaumaris; see below); P160399, a relatively complete right temporal (Beaumaris; see Fig. 1); P160433, eight vertebrae and four ribs (Beaumaris) and P160441, an incomplete right temporal (from Hamilton). Another specimen, P16198 (an isolated tooth; Beaumaris) was identified by Gill (1957, p. 181) as the tooth of a squalodontid cetacean, but it may be a phocid incisor. The provenance of none of these specimens is in doubt. All the Beaumaris specimens (see Gill 1957, text-fig. 11, for map) were found as float derived from within or just above a nodule bed at the base of the Black Rock Formation (as defined by Abele *et al.* 1976, p. 241) at Beaumaris (about 37°59'S, 145°03'E), near Melbourne. The age is probably Cheltenhamian, possibly Kalimnan, latest Miocene-earliest Pliocene. The Hamilton specimen, P160441, was found in place in a coquina (Gill 1957, text-fig. 6) within the Grange Burn Formation (as defined by Abele *et al.* 1976, p. 215), near locality 8 of Gill (1957, text-fig. 3) on the Grange Burn (about 37°44'S, 141°55'E), near Hamilton. The age is probably Kalimnan. The Grange Burn Formation is succeeded by basalt that has been dated at

4.46 ± 0.1 m.y. (1. McDougall *pers. comm.* to T. H. Rich; revision of date provided by Turnbull *et al.* 1965), which indicates that the Hamilton specimen is no younger than Early Pliocene.

The temporal (P160399) figured here is identified as that of a phocid seal (following Burns & Fay 1970, p. 379) because the bulla is inflated relatively more than in otariids and because the entotympanic portion comprises at least half of the bulla. The absence of a prominent posterolaterally projecting rounded crest on the mastoid bone indicates that it belongs in the Subfamily Monachinae (see Hendey & Repenning 1972, p. 73). Relationships at the tribal level, however, are not clear yet. Like the South African latest Miocene-earliest Pliocene species *Homiphoca capensis* (Hendey & Repenning 1972), which de Muizon & Hendey (1980) included in the Tribe Lobodontini, the tympanic bulla partly covers the petrosal posteriorly. However, the lip of the mastoid does not overlap the posteroventral face of the bulla as much as in *H. capensis*. Furthermore, the entotympanic is more inflated in the Victorian specimen, the apex of the petrosal is slightly thicker dorsoventrally, and the carotid foramen is not exposed to ventral view at the posterior of the bulla. The significance of these and other features is uncertain at present. Determination of relationships at the tribal level and below must await detailed comparison with *Homiphoca capensis*, many other nominal species of fossil phocids (e.g., those mentioned by Ray 1976, de Muizon 1981), the extant species. The temporal from Grange Burn, near Hamilton (P160441, not figured here) lacks the entotympanic and the anterior of the petrosal. There are minor differences in ventral topography with P160399, so that at this stage it is not clear whether they are conspecific. Further work is needed in order to determine whether the remaining taxonomically less informative specimens (vertebrae, ribs, and incisor) are those of phocids or otariids.

#### SIGNIFICANCE

Phocid seals generally have a poor fossil record, and many details of their evolution are uncertain. The Victorian specimens are important because they provide the first positive pre-Pleistocene record of southern phocids outside Peru, Argentina, and the tip of South Africa. Previously-described



Fig. 1—Right temporal bone of phocid seal from Beaumaris, NMVP160399, X1. Left, dorsal view. Right, ventral view.

southern fossil phocids include: *Homiphoca capensis* (Hendey & Repenning 1972), latest Miocene-Early Pliocene, South Africa (see also de Muizon & Hendey 1980); *Piscophoca pacifica* de Muizon 1981, Early Pliocene, Peru; and *Acrophoca longirostris* de Muizon, 1981, Early Pliocene, Peru. The Victorian specimens are of similar age to the above, but, because their relationships are still uncertain, it is possible to say little about their zoogeographic significance. They at least fill in what was formerly a large gap in the distribution of southern fossil phocids. Their presence relatively further south than any other known southern phocid suggests that the true seals may have colonised circum-Antarctic waters before the Early Pliocene (see also de Muizon 1982, who mentioned the Victorian record based on information from R. E. Fordyce). Further Australasian finds are anticipated.

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#### REFERENCES

- ABELE, C., *et al.*, 1976. Tertiary. *Spec. Publ. geol. Soc. Aust.* 5: 177-274.
- BURNS, J. J. & FAY, F. H., 1970. Comparative morphology of the skull of the ribbon seal, *Histiophoca fasciata* with remarks on systematics of Phocidae. *J. Zool.* 161: 363-394.
- GILL, E. D., 1957. The stratigraphical occurrence and palaeoecology of some Australian Tertiary marsupials. *Mem. natn. Mus. Vict.* 21: 135-203.
- GILL, E. D., 1968. Fossil sea lion as a palaeoclimatologic indicator. *Palaeogeogr., Palaeoclim., Palaeoecol.* 5: 235-239.
- HENDEY, Q. B. & REPENNING, C. A., 1972. A Pliocene phocid from South Africa. *Ann. S. African Mus.* 59: 71-98.
- McCOY, F., 1877. *Prodromus of the palaeontology of Victoria; or figures and descriptions of the Victorian organic remains. Decade 5.* Government Printer, Melbourne. 41 p.
- MUIZON, C. DE, 1981. Les vertébrés fossiles de la Formation Pisco (Pérou). Première partie: Deux nouveaux Monachinae (Phocidae, Mammalia) du Pliocène de Sud-Sacaco. *Trav. Inst. Fr. ét. Andines.* 22: 1-160. *Recherche sur les grandes civilisations Mémoire 6.* A.D.P.F. Ed., Paris.
- MUIZON, C. DE, 1982. Dispersion des Monachinae (Phocidae, Mammalia) dans l'Hémisphère sud. (Abstract). *9ème Réunion annuelle des Sciences de la Terre*, (Paris 1982): 463. Soc. géol. Fr., Paris.
- MUIZON, C. DE & HENDEY, Q. B., 1980. Late tertiary seals of the South Atlantic Ocean. *Ann. S. African Mus.* 82: 91-128.
- RAY, C. E., 1976. *Phoca wymani* and other Tertiary seals (Mammalia:Phocidae) described from the Eastern Seaboard of North America. *Smithsonian Contrib. Paleobiol.* 28: 1-36.
- TURNBULL, W. D., LUNDELIUS, E. L. & McDUGALL, K., 1965. A potassium-argon dated Pliocene marsupial fauna from Victoria, Australia. *Nature Lond.* 206: 816.

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